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(71) Applicant(s)

**Hosiden Besson Limited**

(Incorporated in the United Kingdom)

**11 St. Joseph's Close, Hove, East Sussex, BN3 7EZ,  
United Kingdom**

(72) Inventor(s)

**Graham George Markham Adcock**

(74) Agent and/or Address for Service

**Hughes Clark & Co**

**114-118 Southampton Row, LONDON, WC1B 5AA,  
United Kingdom**

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**GB 2133250 A**

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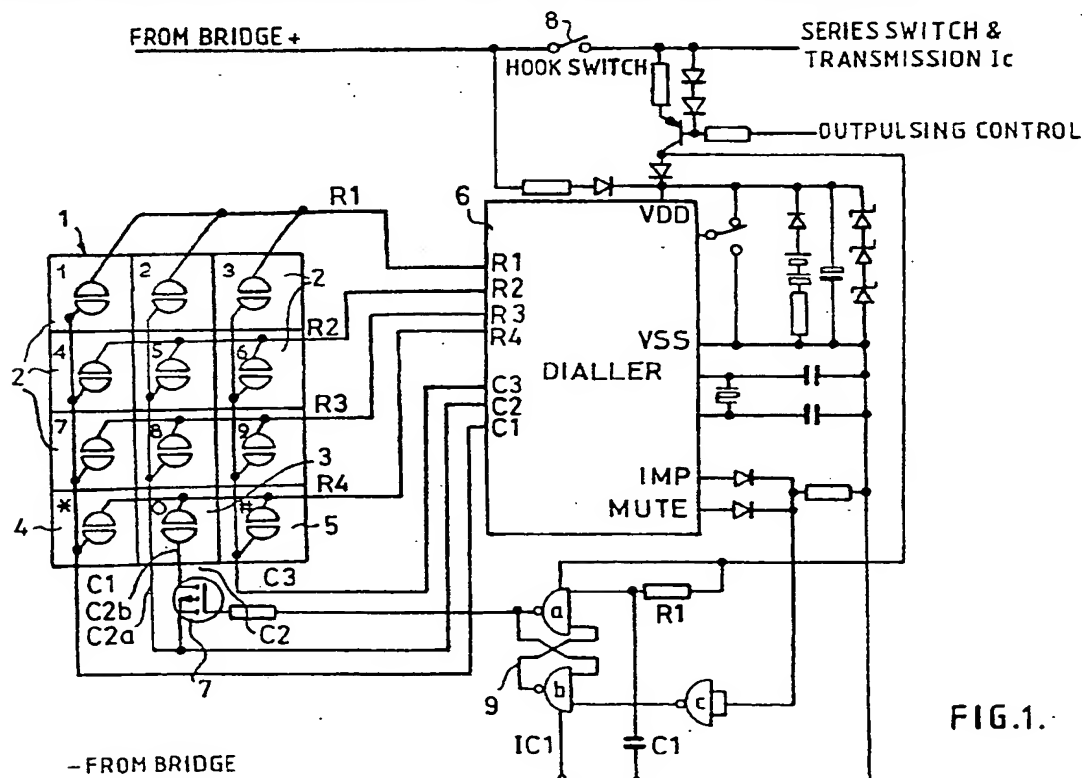
**INT CL<sup>5</sup> H04M**

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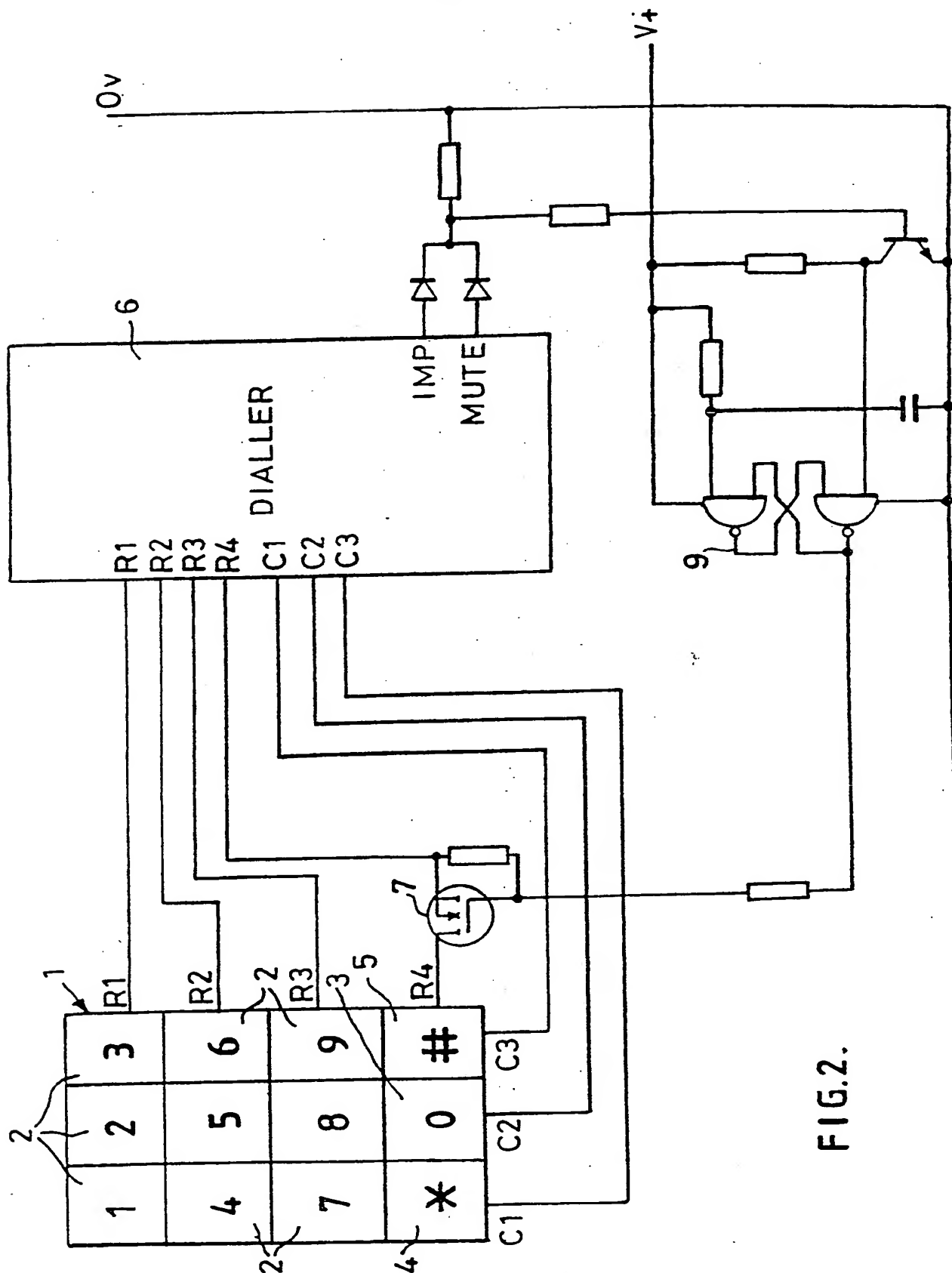
(54) Telephone call barring circuit

(57) An electronic telephone dialling circuit comprises a keypad (1) connected to a dialler (6) which scans the keypad (1) in response to a key (2) having been pressed. The dialler (6) scans the keys (2) of the keypad (1) but does not see a predetermined key i.e. the "0" key (3) until it is brought into the circuit by an electronic switch (7).

A delayed biased latch (9) prevents the "0" key until another key has been pressed.







**FIG. 2.**

TELEPHONE CALL BARRING CIRCUIT

This invention relates to an electronic telephone dialling circuit for controlling the dialling of a telephone number, and in particular to prevent fraudulent use of the telephone system.

5       The major fraudulent use of telephone systems is via the dialling circuit to gain trunk access, in the United Kingdom to the public switched telephone network (PSTN) and to various foreign network which require a '0' zero to be the first digit to be dialled. This call barring  
10 circuit can also be used for preventing access to local networks.

The barring facility operates in loop disconnect dialling (LD) and dual tone multi-frequency (DTMF) modes.

An aim of the present invention is to provide an  
15 electronic telephone dialling circuit which automatically bars access to the telephone network via a specified keyed digit or digits.

According to the present invention there is provided an electronic telephone dialling circuit comprising a  
20 keypad connected to a dialler, the keypad being scanned by the dialler in response to a key of the keypad having been pressed, a delay biased latch at one input to the keypad such that the latch is powered up to cause an open circuit preventing the dialler from receiving an impulse from a  
25 column of the keypad, isolating the dialler from the column of the keypad containing a predetermined isolated key.

Preferably power is applied to the telephone circuit via a hook switch.

30       Conveniently, the dialler and its associated components are fed via a constant current source and reservoir capacitor.

Embodiments of the telephone circuit according to the invention, will now be described by way of example  
35 only, with reference to the accompanying drawings, in

which:

Figure 1 is an electronic circuit diagram of a first embodiment of the invention in the DTMF/LD mode, and

Figure 2 is an electronic circuit diagram of a  
5 second embodiment of the invention in the LD mode only.

Figure 1 shows an electronic telephone circuit for a typical electronic dialler application in the DTMF or LD mode. The circuit comprises a conventional keypad 1 having three columns C1 C2 and C3 forming nine press  
10 button keys 2 for the digits 1 to 9 and three further keys i.e. the '0' zero key 3, the "star" key 4 and "hash" key 5.

The keypad 1 is connected to a dialler 6 which scans the keypad in response to a key 2 having been pressed.  
15 The dialler scans the keys of the keypad but does not see a predetermined key i.e. the "0" zero key 3 until it is brought into the circuit by an electronic switch 7, which is provided in column C2 of the keypad 1.

In operation the power supply is applied to the  
20 circuit via a hook switch 8 when the receiver is "off hook". The dialler 6 and its associated components are fed with current via a constant current source and reservoir capacitor such that the dialler 6 may be isolated from the telephone line during outpulsing.

25 A biased latch 9 formed by IC1 and components R1 and C1 provide a delay at one input to the keypad 1, such that the latch 9 always powers up in a particular state. The initial logic state 1 generated at the latch 9 element 'a' causes the MOSFET to be an open circuit drain to  
30 source preventing the dialler 6 from seeing column C2 and thus the isolated '0' zero key 3. When any other key of the keypad 1 is subsequently pressed (except the "star" and "hash" keys in LD mode) the output from the dialler 6 toggles the latch 9 enabling the column C2 so that the '0'  
35 zero digit may be dialled.

For trunk or International dialling the predetermined key is conveniently the 'zero' key.

Outpulsing or M.F. signalling therefore takes place only on receipt of a valid key press, the start of such signalling resetting the biased latch enabling the previously disabled key for use.

5 If a standard matrix keypad is used in the above circuit then a minor modification must be made to isolate '0' zero key 3 from column C2. This modification is made by adding a wire link which involves the splitting of the wire to the C2 column into C2a and C2b signals. C2a  
10 connects the pad under the '2', '5' and '8' digits with the C2b connection to the pad under the '0' zero key. This modification allows an FET switch 7 to be connected between C2a and C2b such that the FET switch may be opened to exclude the '0' zero key 3 from the keypad 1 or closed  
15 to return the keypad to full operation. If the call barring facility is not required, the FET switch may be omitted and the drain and source holes in the PCB bridged by a wire link (not shown).

With reference now to Figure 2 the circuit shown  
20 operates in the loop disconnect mode and like parts have the same reference numerals and letters as the first embodiment. The telephone instrument of the first embodiment, which will not allow a '0' zero digit to be dialled before a non-zero digit has been dialled, cannot  
25 gain access to the trunk network as the dialling sequence will have been initiated by the first digit and the dial tone lost.

Private automatic branch exchange (PABX) type installations often require an access digit, e.g. '9' to  
30 be dialled before PSTN access is gained, this would prevent the initial '9' digit from being dialled and would deny access to the PSTN in total and not only the trunk network.

Barring of this type can be masked into the IC of  
35 the dialler 6 for small or specialist production runs, particularly where the dialler type varies according to the country or the customer's requirements.

A solution external to the dialler therefore becomes a more attractive alternative.

In loop disconnect mode the 'star' key 4 and the 'hash' key 5 have no function and as such produce no output from the dialler 6. These keys are therefore automatically excluded from the protocol and are ignored as the first digit dialled. A number other than '0' zero must be dialled first.

In the multi-frequency mode the 'star' and 'hash' keys are defined and it causes a possible protocol clash. If the 'star' and 'hash' keys are allowed as a first digit only the '0' zero needs to be excluded.

It is assumed that the 'star' and 'hash' keys will be allowed as a first character. If however, the 'star' and 'hash' keys are to be excluded from the 'first digit' definition, then slightly different circuitry is required as shown in the embodiment of Figure 2. In this embodiment the initial logic 0 generated at the output of the latch 9 causes the MOSFET to be an open circuit drain to source, preventing the dialler 6 from seeing column C2 such that the '0' zero key 3, the 'star' key 4 or the 'hash' key 5 may be dialled.

In this embodiment no modification to the keypad 1 is required.

## CLAIMS:

1. An electronic telephone dialling circuit comprising a keypad connected to a dialler, the keypad being scanned by the dialler in response to a key of the keypad having been pressed, a delay biased latch at one input to the keypad such that the latch is powered up to cause an open circuit preventing the dialler from receiving an impulse from a column of the keypad, isolating the dialler from the column of the keypad containing a predetermined isolated key.
- 10 2. A circuit as claimed in Claim 1, wherein power is applied to the telephone circuit via a hook switch.
3. A circuit as claimed in Claim 1 or 2 wherein the dialler and its associated components are fed via a constant current source and reservoir capacitor.
- 15 4. A circuit as claimed in any preceding claim, wherein the biased latch is formed by an integrated circuit, a capacitor and a resistor providing a delay at one input to the keypad to power up the latch in a particular state.
- 20 5. A circuit as claimed in any preceding claim, wherein the keypad is a standard matrix keypad which is modified by a wire link.
6. A circuit as claimed in Claim 4, wherein the wire link is made by splitting the wire to the column of keys of the keypad into two signal wires, the first signal wire connecting the pads under the digits 2, 5 and 8 and the other signal wire connects the pad under the '0' digit.
- 25 7. A circuit as claimed in Claim 6, wherein an FET switch is connected between the two signal wires such that the FET switch may be opened to exclude the '0' zero key from the keypad or closed to return the keypad to normal full operation.
- 30 8. An electronic telephone dialling circuit substantially as hereinbefore described with reference to and as shown by Figure 1 or Figure 2 of the accompanying drawings.
- 35

9. Each and every novel feature or novel combination of features herein disclosed.

**Patents Act 1977**

**Examiner's report to the Comptroller under  
Section 17 (The Search Report)**

**Application number**

GB 9217521.5

**Relevant Technical fields**

(i) UK Cl (Edition K) H4K KFB

(ii) Int Cl (Edition 5) H04M

**Databases (see over)**

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

**Search Examiner**

MR M J JONES

**Date of Search**

2 NOVEMBER 1992

Documents considered relevant following a search in respect of claims

1-8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB A 2133250 (OKI ELECTRIC) see Figures 3A, 3B, 3C	

Category

Identity of document and relevant passages

Relevant  
to claim

- 8 -

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